A WEBGIS APPLICATION FOR VISUALIZATION AND DISSEMINATION OF ITALIAN SEISMICITY

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ITALIAN SEISMICITY DATA

The national seismic monitoring service is an advanced real-time analysis of seismic data managed by the Centro Nazionale Terremoti in Rome of the Istituto Nazionale di Geofisica e Vulcanologia (INGV).
The service provides a first location within a few seconds of any Italian earthquake and a definite location within few minutes.
The national seismic network allows to record every year more than 10,000 earthquakes throughout the country: as agreed with the Civil Protection Department of Italy, the events with magnitude ML greater than 2.0 are published on the website of the Centro Nazionale Terremoti (*http://cnt.rm.ingv.it*). At the same time all the earthquakes, also the ones with magnitude less than 2.0, are published in **ISIDe** "*Italian Seismic Instrumental and parametric data-base*" (*http://iside.rm.ingv.it*), a database-catalog where earthquakes are stored together with the seismic data of the "Italian Seismic Bulletin" since 2005 (*Figure 1*).

Figure 1 – The ISIDe web portal

THE GEOSIS PLATFORM AND THE REALIZATION OF MAP SERVICES

To integrate the real-time seismicity in a single environment with numerous spatial, geological and seismological data, it has been created a synthesis GIS tools to "frame" the location of an earthquake not only in its local context, but extending it to other useful information derived from databases and studies produced by INGV in the last years.

This is the purpose of the platform **GEOSIS** which is composed primarily by GEOSIS EARTHQUAKE REPORT but also a more complex web interface GEOSIS WEB where it is possible to create custom scenarios with the data of seismic hazard, the historical and recent (1981-2011) seismicity of Italy. These data are available through map services made by ESRI ArcGIS Server.

To extract seismicity data from the database ISIDE has been developed a procedure which involves the creation of map services implemented within the platform ESRI ArcGIS.

This application, called XEQDAC (Xml Earthquake Downloader And Converter), runs in the background and downloads individual seismic events from an internet address, published and updated by the ISIDe database, also used for other applications such as the Apple IPhone INGV Terremoti application (*Figure 2*).

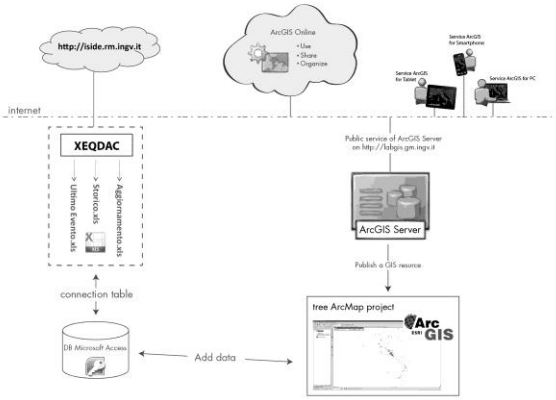

Figure 2 – The XEQDAC workflow

The application creates two separate files: a list of all events (storico) downloaded since its first run; a list with the events of the last three days.

These files are updated every 5 minutes. The Microsoft Excel files created with XEQDAC are imported into Microsoft Access and then upload and classified in a ESRI ArcGIS ArcMap project. From three ArcMap projects have been created

three services (*map services*) by the ArcGIS Server:

1. “storico”, containing earthquakes from January 1, 2012;
2. “aggiornamento”, with the last 3 days of events;
3. “ultimo evento”, the last earthquake.

THE INTEGRATION IN ARCGIS ON LINE

It was decided to develop the platform GEOSIS, previously used only for internal INGV, even for a more substantial use also external.

Therefore the integration of GEOSIS in **ArcGIS Online** has been a logical consequence to share the information relating to the Italian real time seismicity in a geographical environment open and free with the possibility to interact with other geographic data.

ArcGIS Online is a cloud-based geospatial content management system for storing and managing maps, data, and other geospatial information. Built on Esri's cloud infrastructure, it gives you access to geographic content shared and registered by Esri and GIS users around the world.

As a first step it was created the web map in **ArcGIS.com** containing the three map services related to seismicity and the map services developed for the platform GEOSIS. In detail the layers are the following:

1. Real time seismicity layers,
   - Ultimo evento (last event)
   - Sismicità ultimi 3 giorni
   - Sismicità dal 1 gennaio 2012

2. GEOSIS layers,
   - Rete Sismica Nazionale
   - Sismicità 2011
   - Sismicità strumentale 1981-2010
   - Sismicità storica
   - Mappa pericolosità sismica
   - Classificazione sismica su base comunale

For all the layers have been set the display properties (classification and thematization) and query (identify) by configuring the pop-up. When the web map starts there are only two layers visible: the last event and the seismicity of the last 3 days.

As a background map (*ERI Base Maps*) has been chosen the last published by ARCGIS.com, called National Geographic, that allows a clear reading of all the symbols in the various layers and also gives us important information on the morphology and bathymetry of the area as well as main roads and place names.

Using ARCGIS.com tools it was generated the web map application using the default client BASIC VIEWER and it has been configured its properties.

The result is a geographic web application that will soon be made available for all to see the seismicity of Italy in real time allowing the construction of custom scenarios going to superimpose all the information in the map services of GEOSIS.

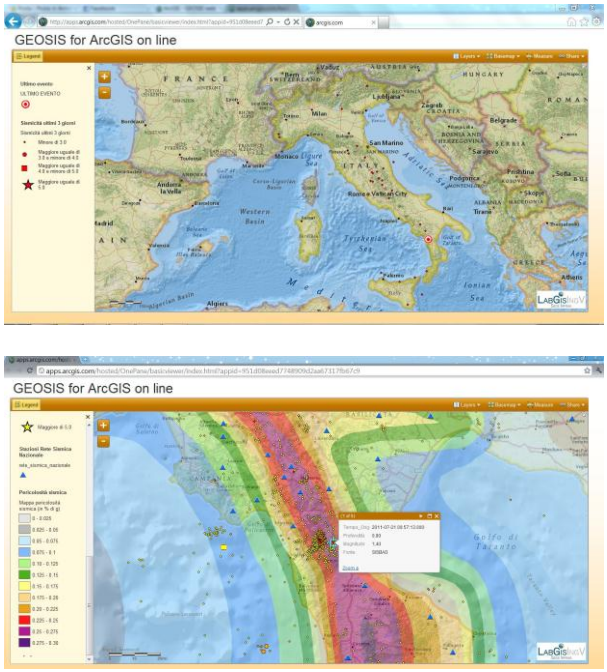

Figure 3 – GEOSIS for ArcGIS Online

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